Variation of vowels in foreigner talk

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（English phonetics）

Abstract

This research covers pragmatic phonetics of the English language. Based on a spontaneous dialogs survey carried out at the Phonetic Laboratory of Yamagata University in Japan in 2008-2009, it provides a portrait of the features of vowels of foreigner talk. The main focus of the research is on the causes and the consequences of vowel change whose features are defined by values of the first and the second formants. Although a major aim of this report is the establishment of the links between an English native speaker's talk and his foreigner talk, there is also extensive information on the role of the linguistic adjustment effect in the development of vowel change in foreigner talk. A preliminary experiment is conducted for the examination of vowels with a possible outcome that native English speakers, especially those who have been living in Japan for a long time present a different phonetic quality when they interact with Japanese learners of English. It is observed that vowel space tends to expand much more in oral readings of word lists than in dialogs. It is also observed that vowel space expands more when native English speakers talk with non-native speakers, in this case with native Japanese speakers. The expansion of vowel space is also observed when they orally read a native Japanese speaker's transcript.

0. Introduction

Vowels have been studied thoroughly with their phonetic factors (Wright, 2003). Besides these factors, pragmatic factors are also necessary to investigate speech in communicative situations. Research into the variability of spontaneous speech is crucial for the study of experimental phonology. Theories of speech production must provide an account of ordinary variability in speech. Vowels of foreigner talk are less lazy than those of native speakers in dyads in general. It is suggested that the reduction of vowels is determined not only by the functioning of the underlying grammatical rules, but also by a variety of other factors, such as speed or informality. The phenomenon observed in the experiments of this study might offer insight in how to solve the complex interaction of factors that are grammatically determined and those that are caused by a contextual determinant.

Phonetic research on sound variation has been conducted for studying present day languages

which include native speakers and foreign language learners (Hibiya, 2002; Minematsu, 2003; Dantsuji, 2005; Hirose, 2005). There are, however, scarce phonetic research which analyzes features in talk by native speakers to speakers who are not as linguistically skilled as them, such as foreigner talk, baby talk or teacher talk. This study investigates the phonetic features of native English speakers' interaction with Japanese learners of English with applying acoustic analyses employed in the field of phonetic study to the foreigner talk that are familiar but have not been investigated thoroughly in the field of language education. The author predicts that English speakers, especially those who have been living in Japan for a long time and have been learning Japanese, would present a different phonetic quality when they interact with Japanese learners of English.

1. Foreigner talk

Studies on foreigner talk focus on the features of native speakers' speech in a contact situation with non-native speakers (Koike, et al., 2003:837). Approaches to the study of the foreigner talk include sociolinguistic (Coulmas, 1997:249), pragmatics (Bortfeld, 1997), psycholinguistic (Hummert, 1996), and language educational ones (Patil, 1994; Braidi, 2002), most of which focus on syntactic and lexical reduction or simplification processes. As is illustrated in Jenkins (2000: 177), there is still no general agreement as to exactly what triggers foreigner talk, or why it varies among native speakers' or among combinations used by the same speaker on different occasions.

2. Causes of vowel change

As is pointed out by Jenkins (ibid.:194), with increasing familiarity with a particular interlocutor's L1 accent, speakers appear gradually to switch from the blanket replacement of all core items (when it is within their competence) to a selective needs-based strategy according to the interlocutor's needs which they can simultaneously decrease. The same process is probably true of increasing familiarity with an accent per se, although future research is required to clarify the extent to which this is the case. English and Japanese have contrastive vowel systems. English has a complex vowel system without a long/short length contrast, and Japanese has a simple vowel system with a long/short length contrast. From the view point of contrastive linguistics, Japanese is a type of language with a small number of vowel phonemes and English is a type of language with a large number of vowel phonemes (Kubozono, 1998:40-41).

The vowel contrast is expected to affect speakers' speech when English native speakers and Japanese native speakers interact especially in dyad talk. There are several researchers who have

investigated the effects of the phonological features of English on the acquisition of Japanese; Jennifer, et al. (2003) and Kondo (2005) studied the production of Japanese length contrasts by native English speakers. Minagawa (1996) researched the perception of Japanese length contrasts by native English speakers. The results of these research studies show the acquisition of contrasts of novel features with the transfer of features present in their native language.

It must be hard for a person to acquire the contrasts of the novel features of a different language and still more to try to show these contrasts for native speakers of this language who learn his /her native language as a foreign language. It is expected, however, that an interactive adjustment effect takes place between dyadic speakers of different languages. That is, native speakers tend to adjust their utterances accordingly when they talk with learners, especially, in the case that they are eager to make the learners understand them and understand how to make themselves understood.

3. Spontaneous speech

Phonetic research in sound change and variation were mainly conducted on question and answer routines recorded in laboratories. The focus of some of these researchers, however, has been shifted from the consultative style to the free flow of spontaneous speech to obtain features of lively real speech. The author estimates that it is not an intentional pronunciation of the consultative style speech but the unintentional casual dialogs that present the real data for phonetic features of foreigner talks. An ideal condition to obtain lively real speech in natural communicative situations must be the one which records natural conversations in natural settings. This condition, however, incurs unnecessary background noises. So the speech data of this kind of study are recorded not in real communicative situations but in laboratory settings to attenuate their unnecessary background noises as much as possible.

4. Experiment

4.1 Participants

Selection and interviewing of informants were mostly conducted in Yamagata prefecture, the northern part of Japan. Two native speakers of English from Arizona and two Japanese students who majored in English took part in this experiment. One of the native speakers was a female and the other was a male. Japanese students were both twenty-one-year-old females and in their third year at Yamagata University.

4.2 Stimuli

Dialogs in each dyad, two native English speakers or one native English speaker and one Japanese English learner, were collected. Before the recording of spontaneous dialogs, 24 words that held one of the vowels; /iː/, /ɪ/, /æ/, /ɑː/, /ʊ/, /uː/, starting with /h/ and ending with /d/ or /t/, or starting with /b/ and ending with /d/ or /t/ were orally read three times respectively.

4.3 Procedure and apparatus

Recordings were conducted in a sound-attenuated room using two unidirectional right and left stereo cardio microphones. Signals were recorded into two separate digital files on a computer. That made it easier to transcribe each speaker's dialogs later. In addition, the timing of these two files was exact. That accuracy made it easier to place dialog overlaps later on in the analysis. Speakers were presented with printed instructions. They were asked to talk as they usually did when they got together. In this way, dialogs of around 15 minutes were recorded.

4.4 Acoustic analysis

Six vowels, /iː/, /ɪ/, /æ/, /ɑː/, /ʊ/, /uː/ were selected as measurements. Words containing the target vowels were extracted from the utterance and the vowel analysis conducted using Praat were produced while focusing on F1 and F2 integral formant measurements in Hertz.

4.5 Results

The data of speaker A with four types of readings are represented in Figures 1 to 4: word list, casual talk with a native speaker, casual talk with a non-native speaker, oral reading of a non -native speaker's transcript with their non-native speaker counterpart.

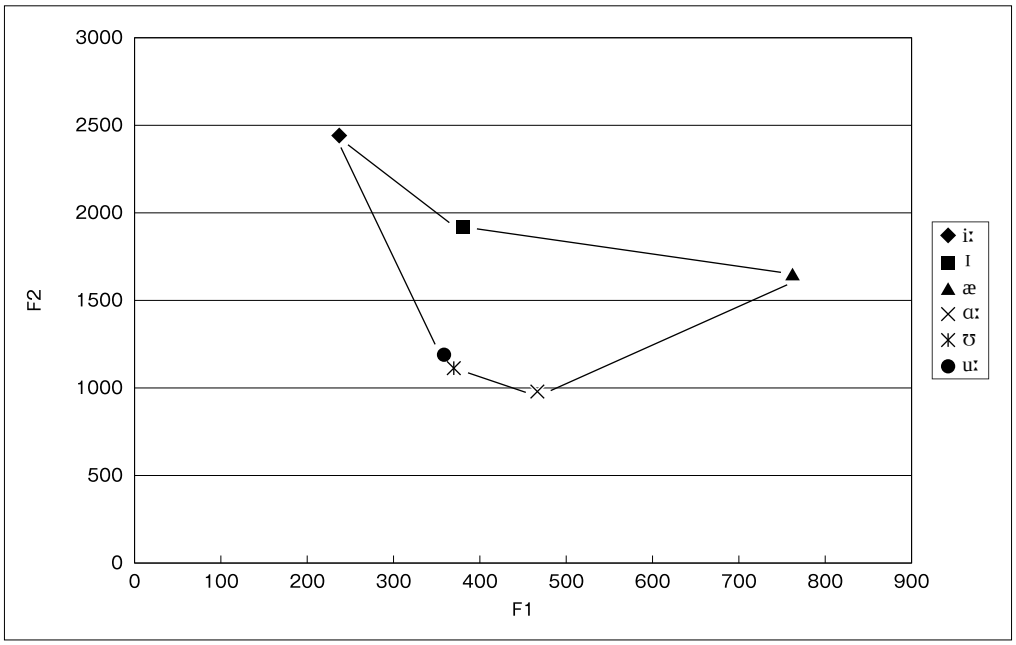

Figure 1. Formant values of vowels in speaker A's oral reading of a word list

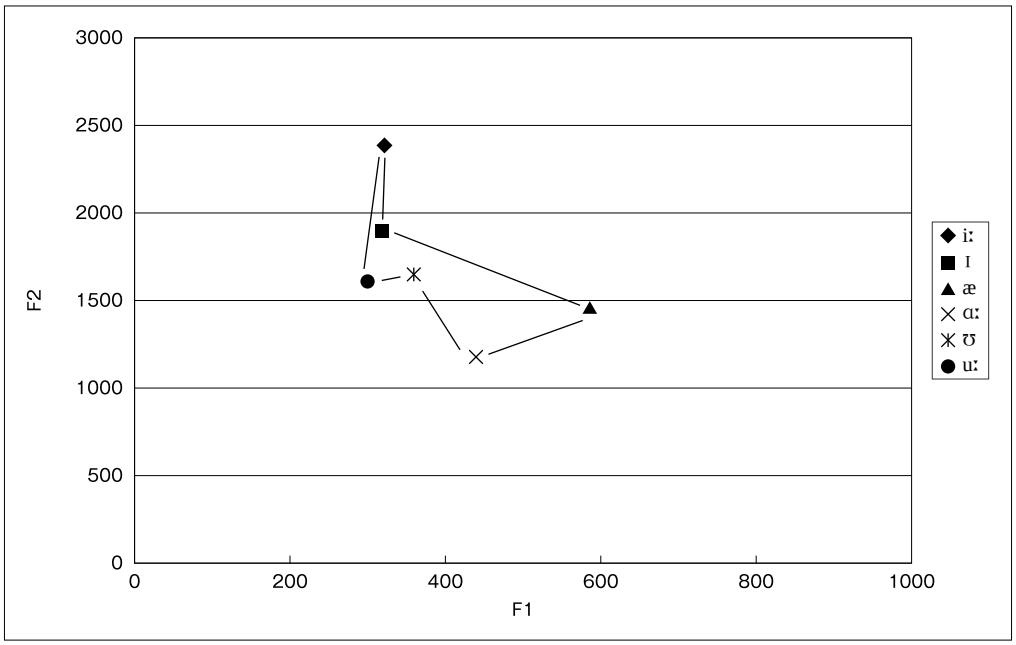

Figure 2. Formant values of vowels in speaker A's dialogs with the other native speaker

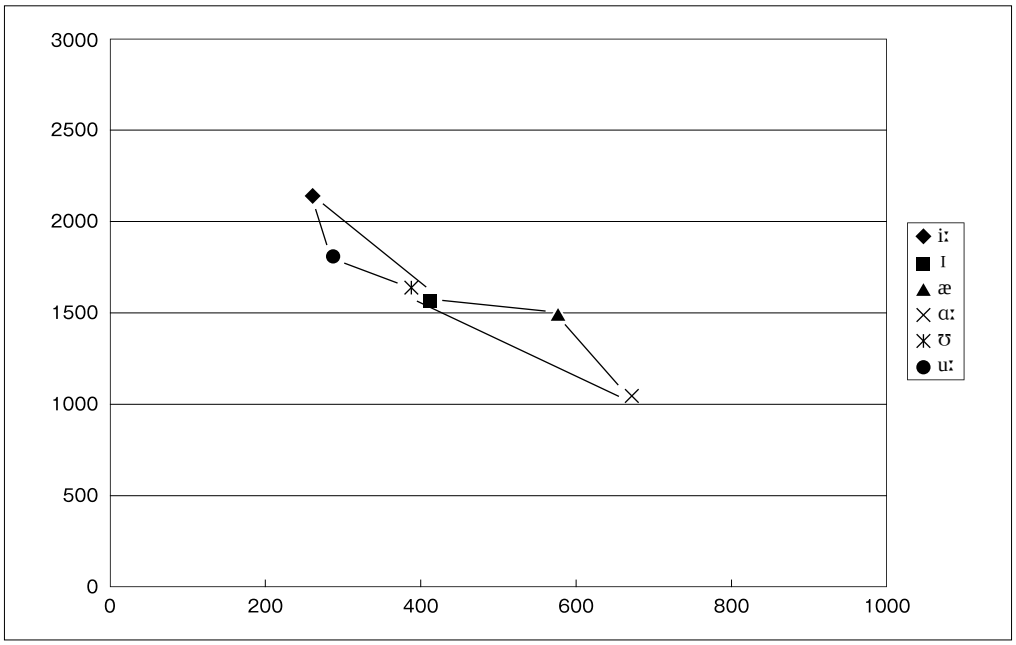

Figure 3. Formant values of vowels in speaker A’s dialogs with a non-native speaker

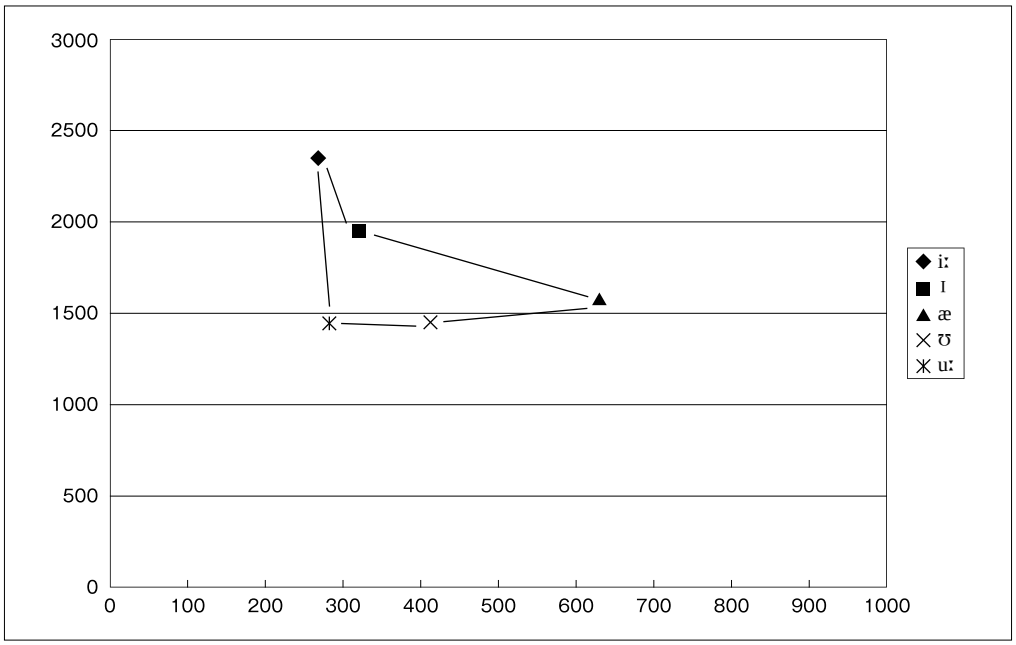

Figure 4. Formant values of vowels in speaker A’s oral reading of a native Japanese speaker’s transcript with the other native Japanese speaker

As predicted, vowel spaces enclosed by the six vowels are largest in an oral reading of the word list. The vowel space in spontaneous speech with the other native speaker is smaller than that of the oral reading of the word list. This is a natural phenomenon as spontaneous speech is usually fast and unclearly conveyed. The vowel space in the spontaneous speech with non -native speakers expands more than the one with the native speaker, but not as much as the author's expectation of attaining a much larger vowel space for dialogs with non-native speakers than those with native speakers. The oral reading of the non-native speaker's transcription is expected to cause larger vowel spaces than those of spontaneous speech as oral reading loses casualties of spontaneous speech. In addition, with the non-native speaker's transcript, the speaker may not be able to read it naturally and casually.

5. Discussions and conclusion

Lax vowels are described as lazy variants of the corresponding tense vowels, which are articulated with a greater variation of the vocal cavity from its neutral (rest) position (Chomsky and Halle, 2002:69). Vowels of foreigner talk are less lazy than those of native speakers in the dyad in general, among which two vowels, /iː/, /æ/ show a significant change of vowel quality. This means tense vowels, except /uː/, tend to be sensitive to different speaking styles and articulated with greater variation than the corresponding lax vowels. It is suggested that the reduction of vowels is determined not only by the functioning of the underlying grammatical rules, but also by a variety of other factors (speed, casualness, frequency of use of the items, predictability in a particular context, etc.), and that these factors interact in complex ways to determine the extent and place of vowel reduction (Chomsky and Halle, ibid.:110). The phenomenon observed in the experiments of this study, however, might give a clue to solve the complex interaction of factors that are grammatically determined and those that are caused by a contextual determinant. In this case, the speaking partner's native language with a difference in vowel quality must affect foreigner talk.

The focus of this study is to analyze the vowel quality of foreigner talks and the extent to which this can be modeled as a categorical phonological modification or as the result of phonetic gradient effects. The experiments of this study show that the change of vowel quality in foreigner talk may be a kind of non-categorical gradient phenomena. The tendency observed in this study suggests that there is a possibility that the vowel change occurs more frequently with higher and more peripheral vowels. This goes along the rules of the location of stress: lower vowels are more optimal stress-bearing units than higher vowels and peripheral vowels are more optimal

than central vowels as described by Kenstowicz (2004:191). Yaeger-dror (1994:267) focuses on rules for vowel shifting or other linguistic changes which are found to operate in one speech community help formulate theoretical and cognitive components of their grammar, and, by extension, they help to determine the typological possibilities available for all human languages. There is a possibility that the phonetic analysis of foreign talk would provide a view of the systematic sound changes in progress that are responsible for increasing diversity among the English language because of the expansion of its use as a global language. Furthermore, to investigate the role of linguistic adjustment effect in the development of vowel change in native English speakers, at least a dozen speakers who have been teaching for a significant amount of time are necessary. In addition, not only the parameter of undershooting but also the other parameter, length, might be applied to the data obtained from recordings of longitudinal studies.

Acknowledgments

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Appendix

Appendix A

Samples with vowels, /iː/ and /ɪ/ or /ɑː/ and /æ/ or /uː/ and /ʊ/

Word list

vowel	/h-d/	/h-t/	/b-d/	/b-t/
/iː/	heed	heat	bead	beat
/ɪ/	hid	hit	bid	bit
/ɑː/	hod	hot	bod	bot
/æ/	had	hat	bad	bat
/uː/	**hoodoo	hoot	booed	boot
/ʊ/	hood	*hook	**Buddha	*book

* words with different contexts are listed as there are no words with /h-t/ or /b-t/.

** not mono-syllable but two-syllables words are listed as there are no mono-syllable words in these contexts.

Appendix B

Formant values for oral reading of word lists for Speaker A

vowel	/h-d/		/h-t/		/b-d/		/b-t/	
	F1	F2	F1	F2	F1	F2	F1	F2
1st /iː/	237	2435	242	2503	224	2441	229	2476
2nd /iː/	238	2465	247	2416	239	2471	254	2462
3rd /iː/	230	2406	237	2396	237	2476	240	2449
1st /ɪ/	377	1924	414	1940	357	1990	428	1867
2nd /ɪ/	400	1862	427	1873	367	1964	416	1863
3rd /ɪ/	411	1857	426	1970	382	1932	424	1904
1st /ɑː/	470	977	788	1254	557	951	490	1307
2nd /ɑː/	565	1018	745	1153	619	1065	477	1339
3rd /ɑː/	522	979	791	1277	559	1052	512	1274
1st /æ/	779	1684	893	1662	662	1672	812	1594
2nd /æ/	775	1662	860	1625	688	1614	825	1661
3rd /æ/	711	1671	797	1651	664	1675	834	1608
1st /uː/	358	1226	280	1156	250	1029	259	1134
2nd /uː/	394	1443	258	1220	249	1085	274	1291
3rd /uː/	369	1371	256	1116	268	1039	261	1152
1st /ʊ/	369	1179	433	1093	283	1178	404	1119
2nd /ʊ/	378	1365	440	1159	280	1171	445	1124
3rd /ʊ/	380	1461	431	1184	268	1134	433	1084

Appendix C

Samples with vowels, /iː/ and /ɪ/ or /ɑː/ and /æ/ or /uː/ and /ʊ/

vowel	examples
/iː/	see, meet
/ɪ/	did, with, it
/ɑː/	what, start
/æ/	practice, back, Japan
/uː/	too, few
/ʊ/	good

Appendix D

Formant values for spontaneous dialogs

vowel	speaker A (with native English speaker)	
	F1	F2
/iː/ in *meet*	311	2306
/iː/ in *see*	369	1931
/iː/ in *we*	331	2105
/ɪ/ in *did*	308	1863
/ɪ/ in *with*	328	1303
/ɪ/ in *it*	456	1743
/ɑː/ in *what*	421	1202
/ɑː/ in *start*	549	1096
/æ/ in *practice*	581	1445
/æ/ in *back*	535	1494
/æ/ in *Japan*	408	1791
/uː/ in *too*	296	1614
/uː/ in *few*	250	1948
/ʊ/ in *good*	362	1637
/ʊ/ in *good*	324	1710

Appendix E

Samples with vowels, /iː/ and /ɪ/ or /ɑː/ and /æ/ or /uː/ and /ʊ/

vowel	examples
/iː/	Steve, meet, freely
/ɪ/	him, English, hip
/ɑː/	talk, from, hop
/æ/	have, handsome, embarrass
/uː/	student, too, do
/ʊ/	good

Appendix F

Formant values for spontaneous dialogs

vowel	speaker A (with native Japanese speaker)	
	F1	F2
/iː/ in *Steve*	241	2138
/iː/ in *meet*	338	2183
/iː/ in *freely*	298	2038
/ɪ/ in *him*	399	1562
/ɪ/ in *hip*	374	1898
/ɪ/ in *is*	263	1848
/ɑː/ in *talk*	653	1042
/ɑː/ in *from*	460	1170
/ɑː/ in *hop*	636	1089
/æ/ in *have*	577	1489
/æ/ in *handsome*	489	1778
/æ/ in *embarrass*	516	1686
/uː/ in *student*	270	1796
/uː/ in *too*	350	1396
/uː/ in *do*	340	1615
/ʊ/ in *good*	374	1633
/ʊ/ in *good*	374	1124
/ʊ/ in *good*	346	2027

Appendix G

Samples with vowels, /iː/ and /ɪ/ or /ɑː/ and /æ/ or /uː/ and /ʊ/

vowel	examples
/iː/	each, she
/ɪ/	linguistics, is, with
/ɑː/	—
/æ/	bad, Japanese, plan
/uː/	student, who
/ʊ/	good

Appendix H

Formant values for oral reading of slightly edited dialogs

vowel	speaker A reading native Japanese speaker's transcript (with native Japanese speaker)	
	F1	F2
/iː/ in *each*	269	2334
/iː/ in *she*	399	1828
/ɪ/ in *linguistics*	425	1186
/ɪ/ in *is*	311	1961
/ɪ/ in *with*	329	1459
/æ/ in *bad*	619	1589
/æ/ in *Japanese*	615	1642
/æ/ in *plan*	440	1721
/uː/ in *student*	284	1442
/uː/ in *who*	324	1226
/ʊ/ in *good*	403	1439

山形大学紀要（人文科学）第17巻第１号

対外国人発話の母音音響特徴分析

冨　田　かおる

英語母語話者同士、及び英語母語話者と日本人英語学習者との対話の音響特徴を分析し、対外国人発話における母音の特徴を調べた。リスト読み、母語話者との対話、日本人英語学習者との対話の第１フォルマントと第２フォルマントを比較すると、予想通り、リスト読みでは、母音は発音空間の周辺に近い位置で発せられ、対話では中心に近い位置で発せられた。対母語話者と対学習者の場合を比較すると、後者の方が周辺に近い位置での発話であったが、あまり大きな違いは観察されなかった。日本人英語学習者同士の対話を文字おこししたものを用いた対話風朗読では、リスト読み程ではないが、周辺に近い位置での発話が観察された。